

# Summary of Shimming Results in 21Q40 Quadrupoles

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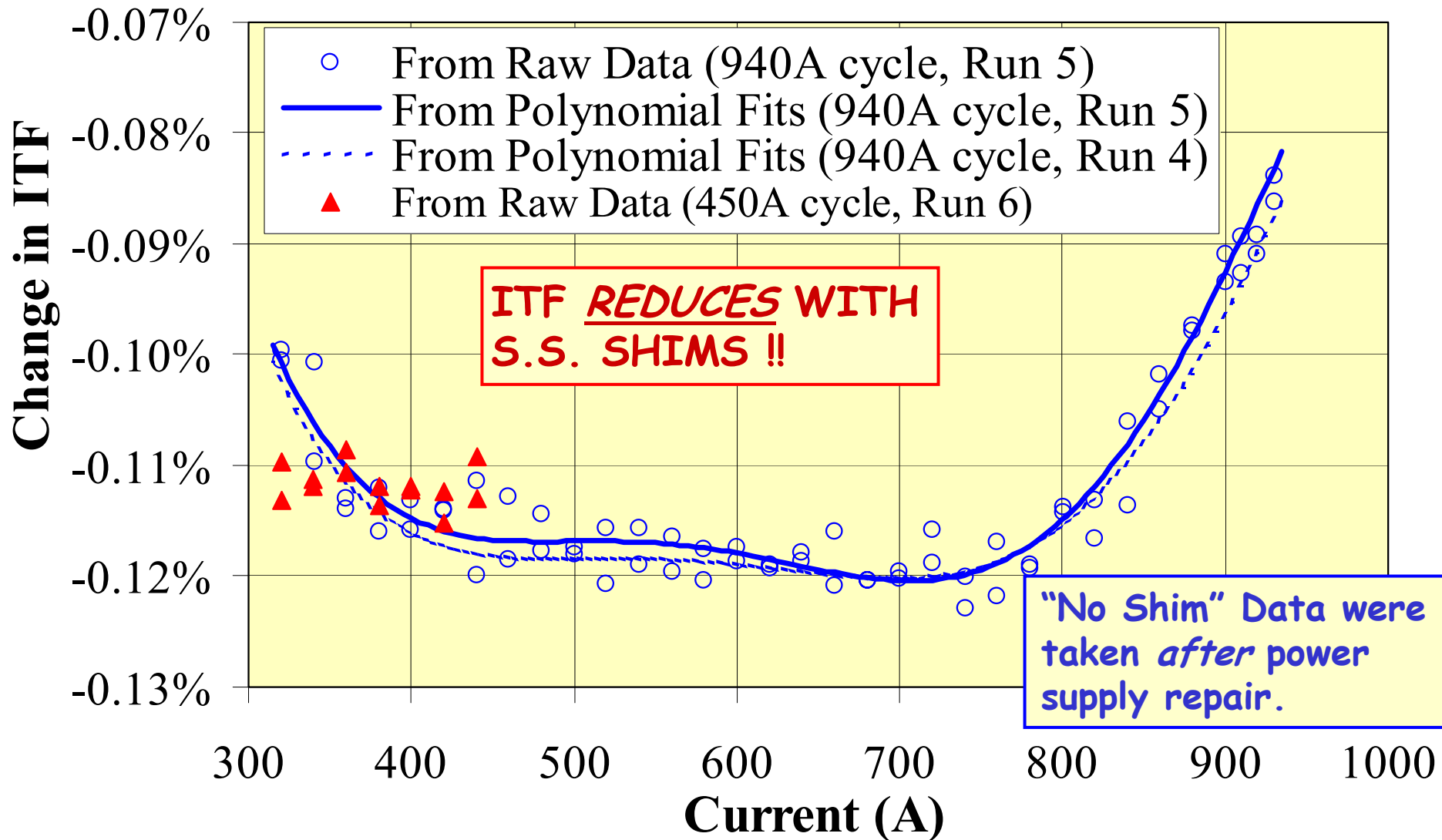
*Superconducting Magnet Division, BNL*

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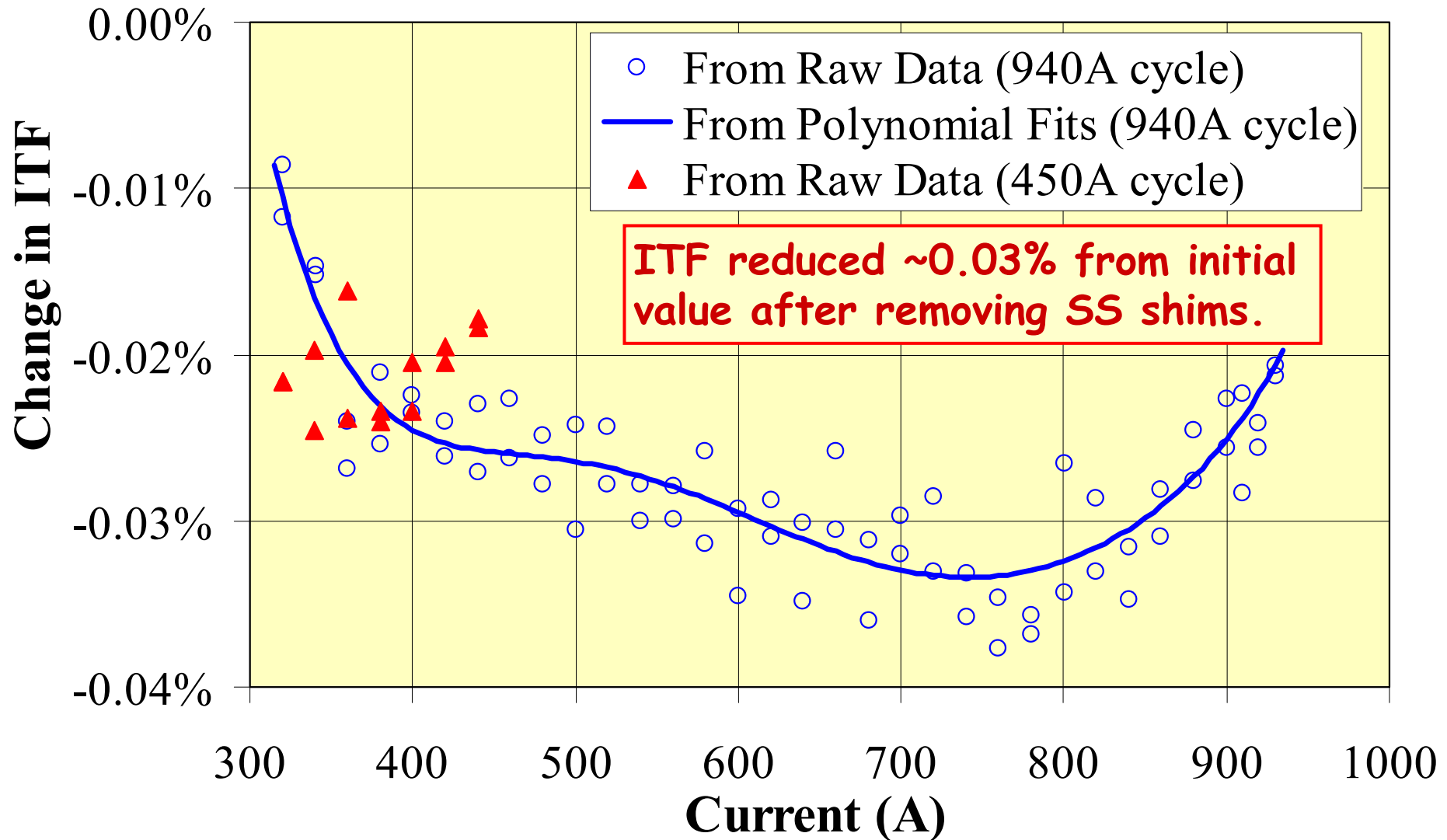
# Shimming Results in 21Q40

- One quad with 1 mil **stainless steel** shims (Sl. No. 14)
- **Stainless steel shims significantly reduce the I.T.F. !!**
- Sl. No. 14 re-shimmed with 1 mil iron shims.
- Seven quads with 1 mil iron shims (# 2, 3, 14, 15, 16, 20, 23)
- # 15 re-shimmed with additional 1 mil iron shim (2 mil total).
- Sl. No. 2 and 3 were measured without shims early in the program, before power supply was repaired.
- # 2 and 3 results are significantly different from the remaining quadrupoles (# 14,15\_(1),16,20,23), but similar to # 15\_(2).
- Results for 940 A cycle agree with those for 450 A cycle, except for Sl. No. 20, where results disagree by  $\sim 0.02\%$ .
- Including all results, the **average change** in I.T.F. **at 700A** for 1 mil shim is **0.036%**, with an **RMS variation of 0.02%**.

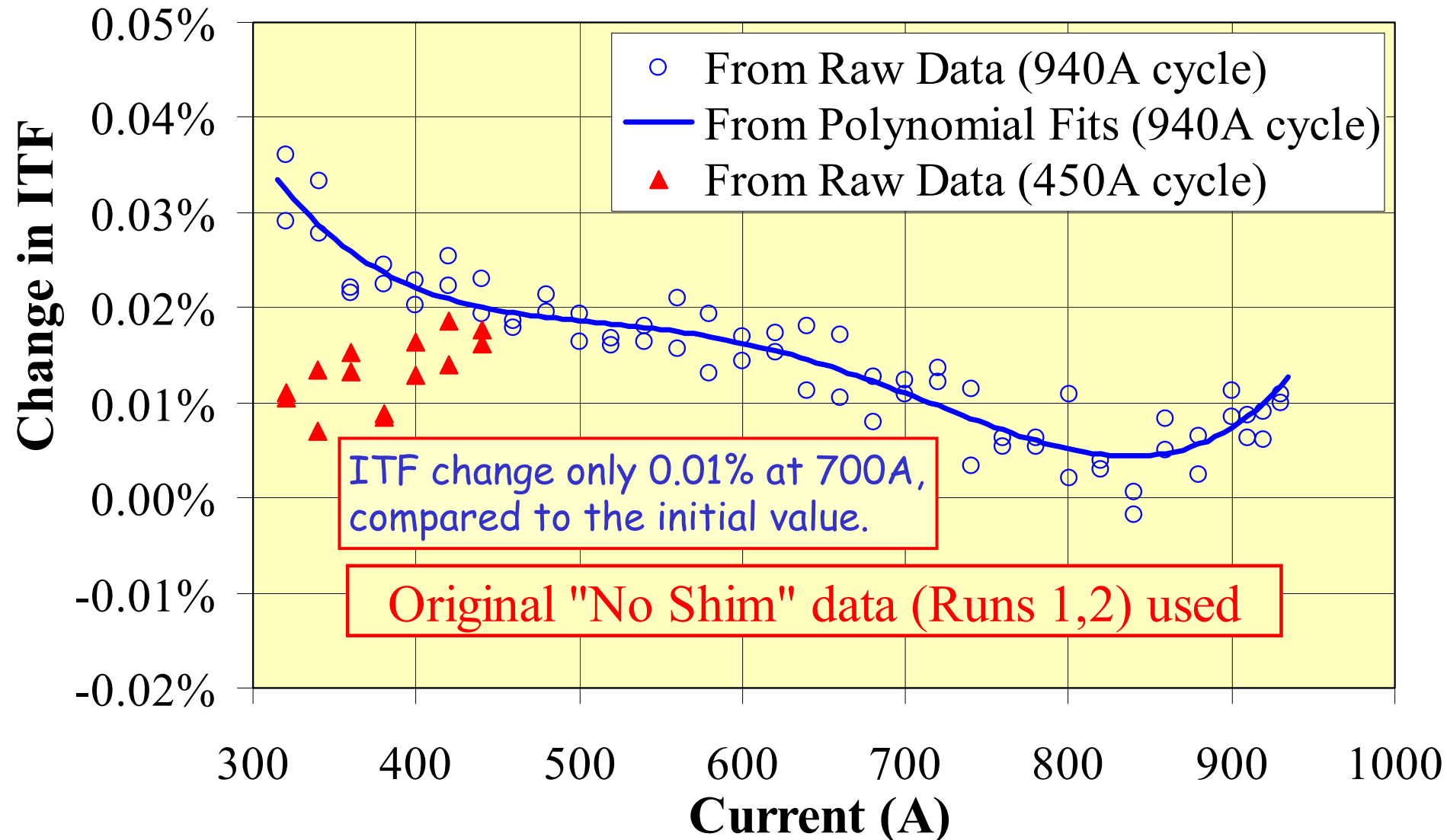
## SQ2114: Effect of 1 mil S.S. Shims Under Poles



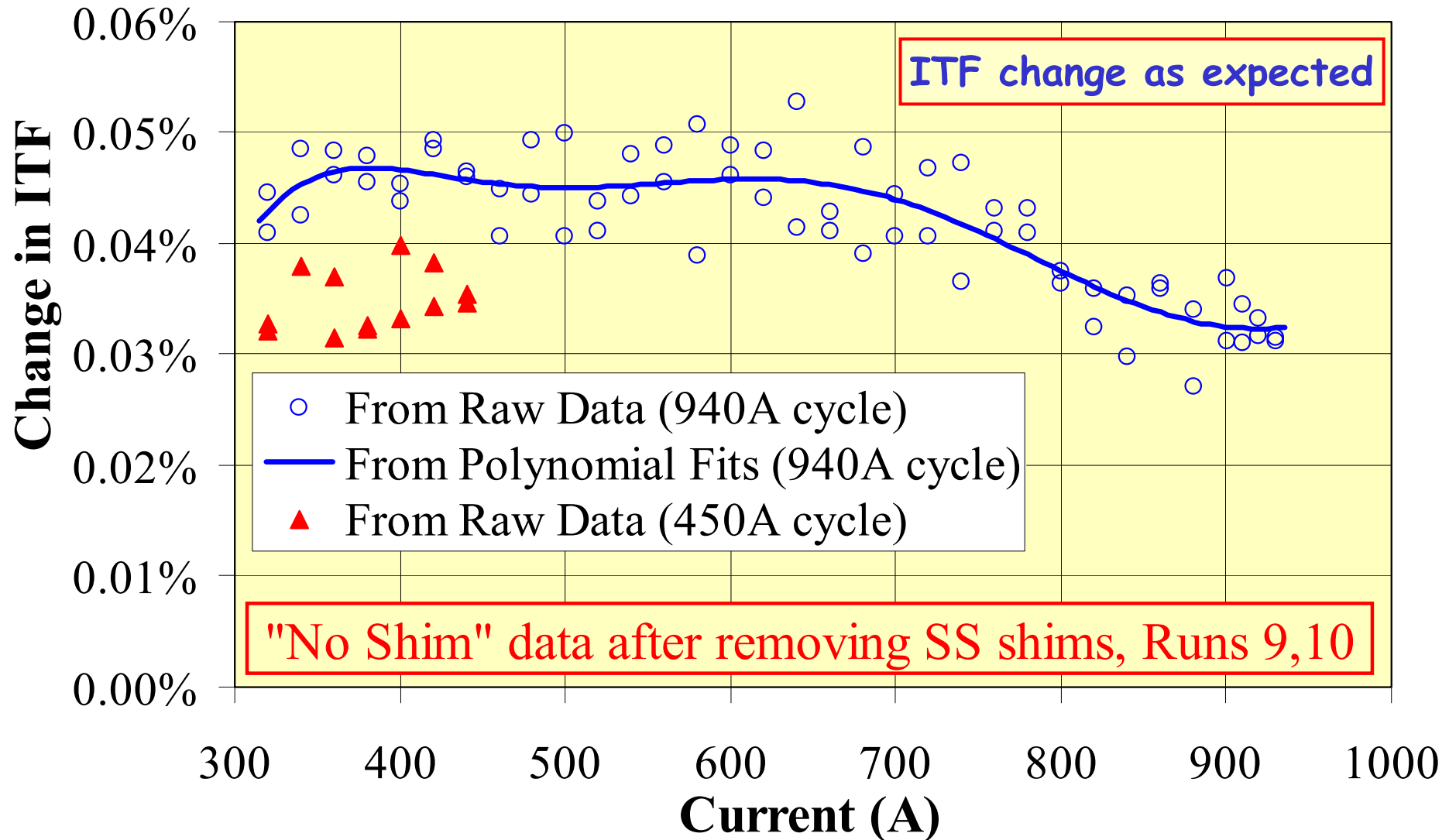
## SQ2114: Before shimming Vs after shims removed



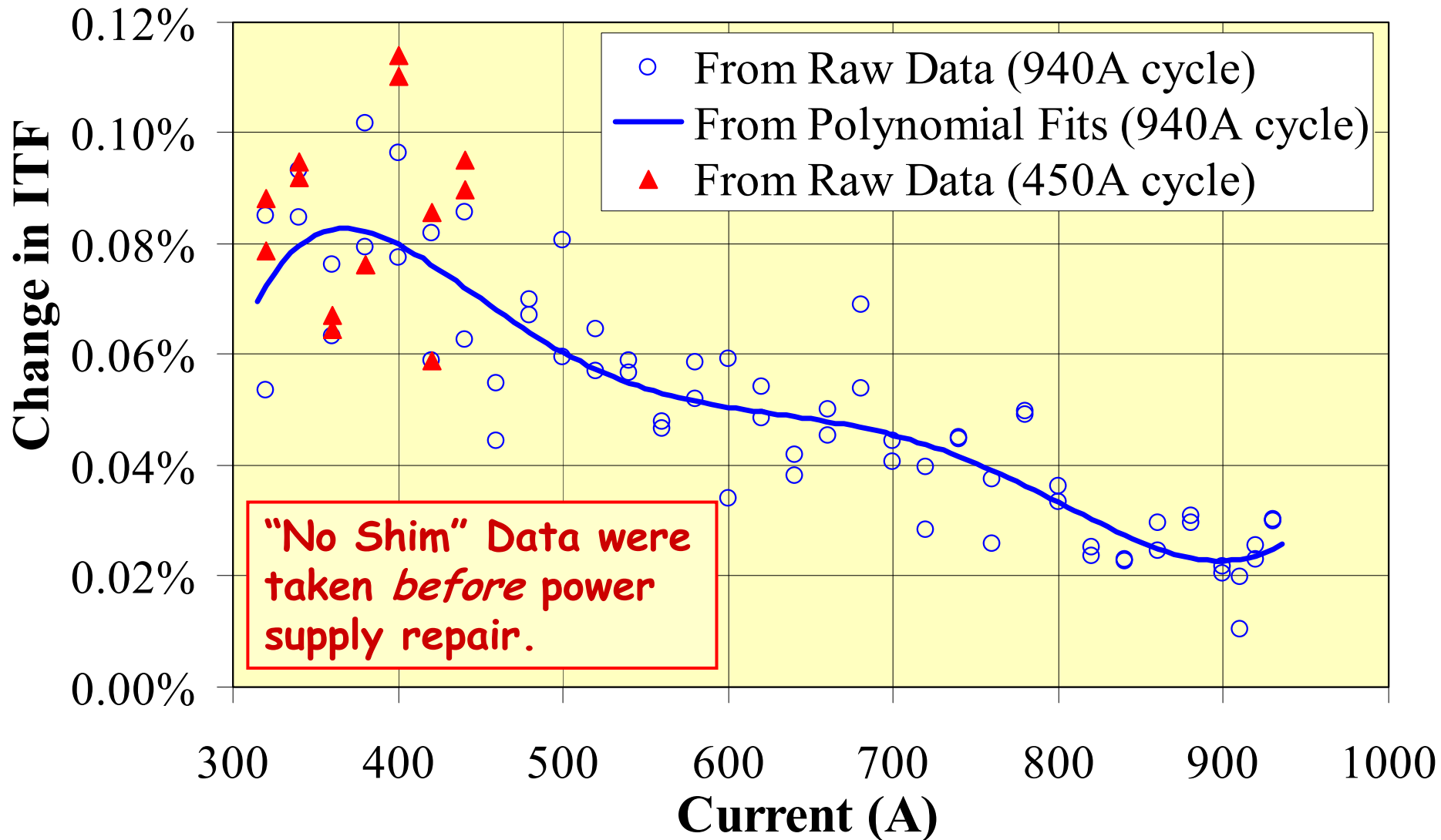
## SQ2114: Effect of 1 mil Iron Shims Under Poles



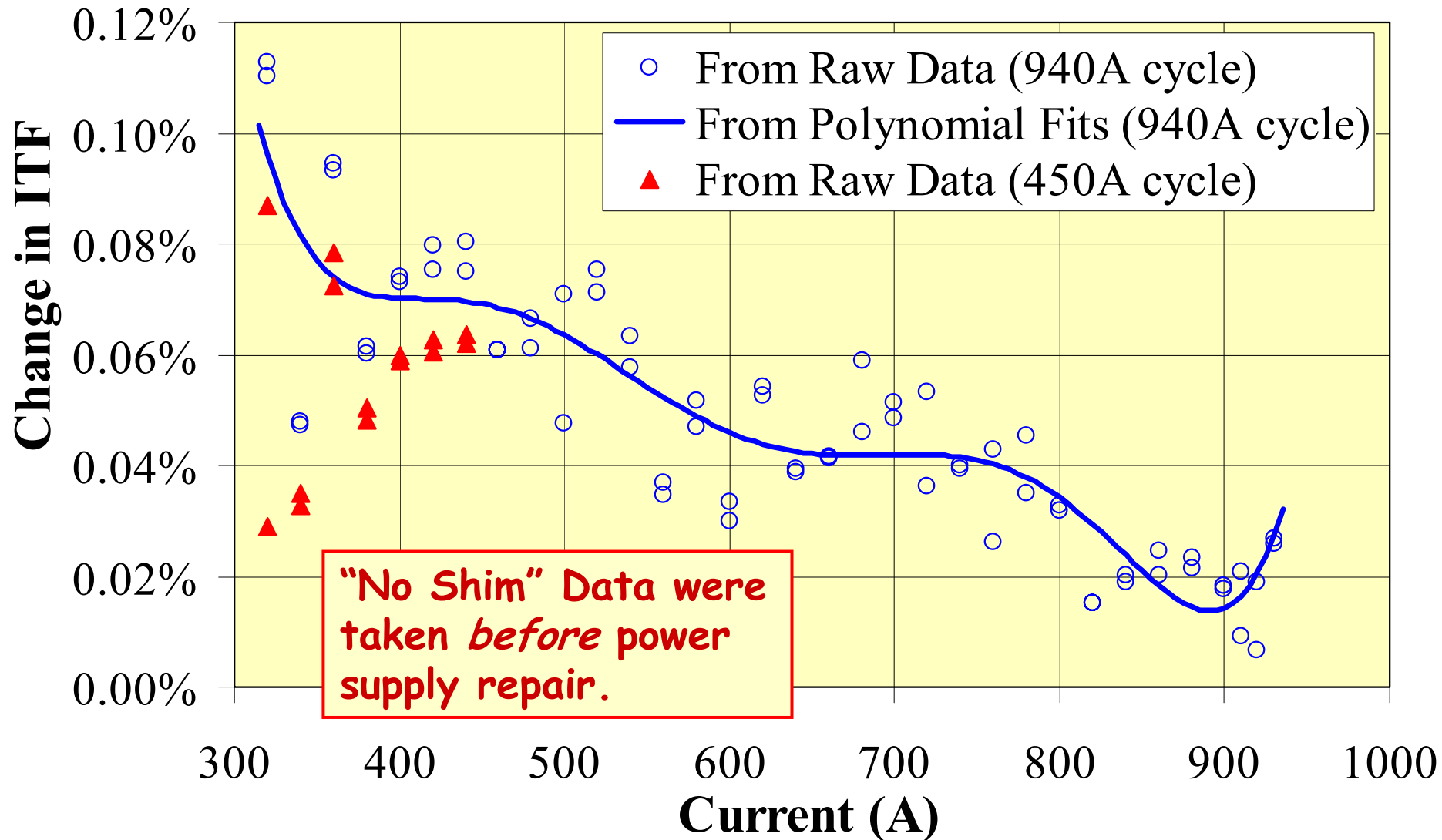
## SQ2114: Effect of 1 mil Iron Shims Under Poles



## SQ2102: Effect of 1 mil Iron Shims Under Poles

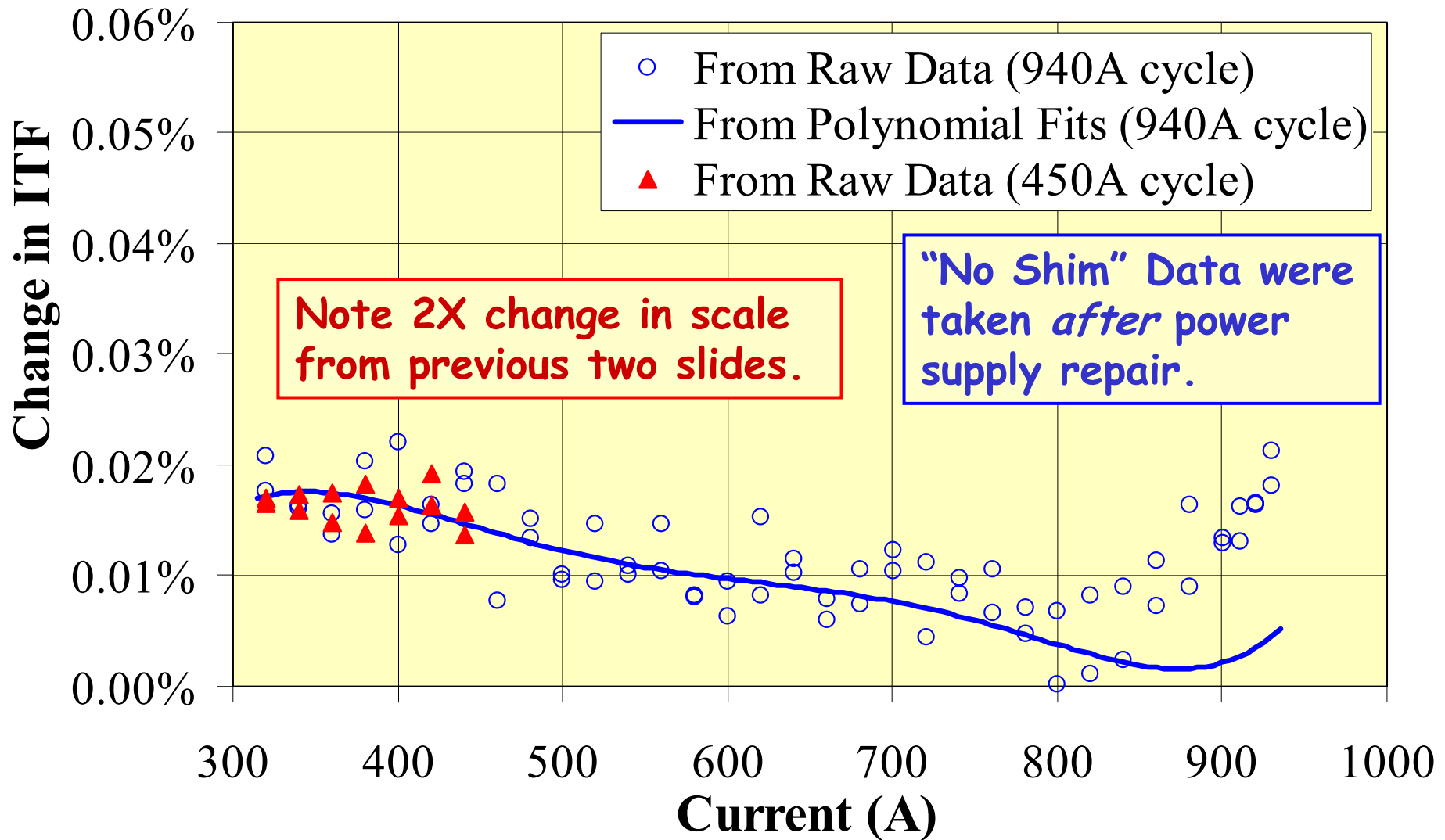


## SQ2103: Effect of 1 mil Iron Shims Under Poles

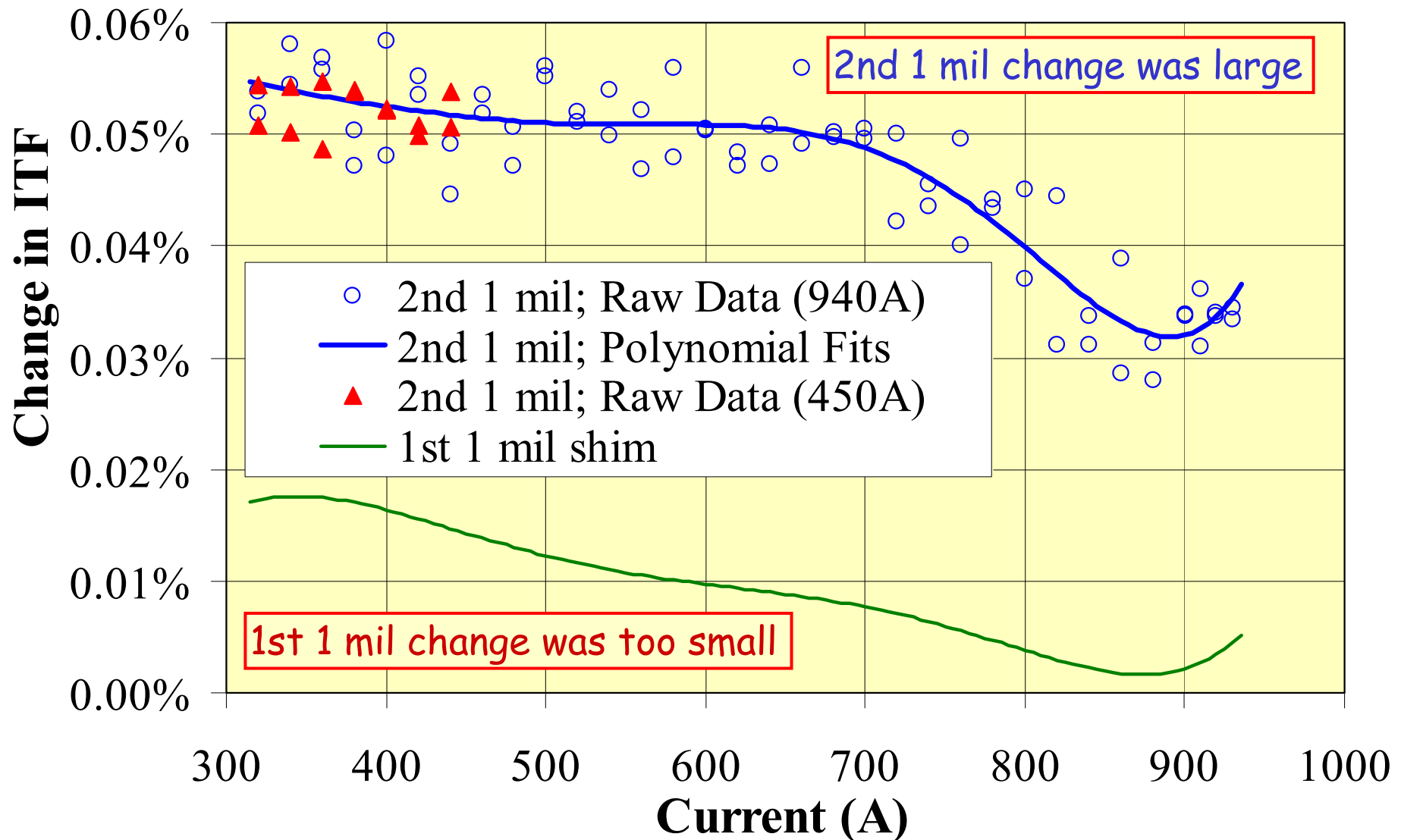




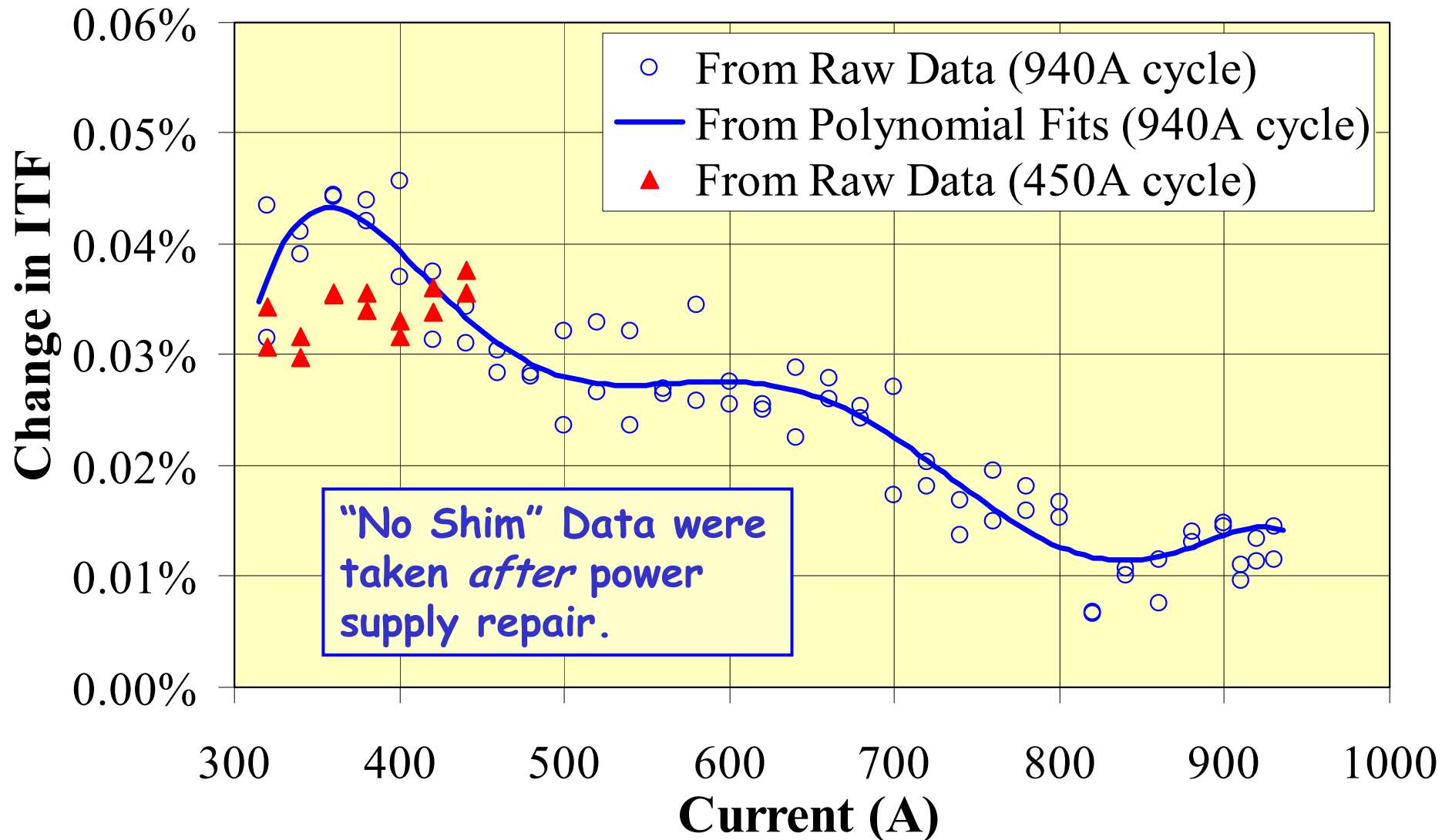
## SQ2115: Effect of **First** 1 mil Iron Shims Under Poles



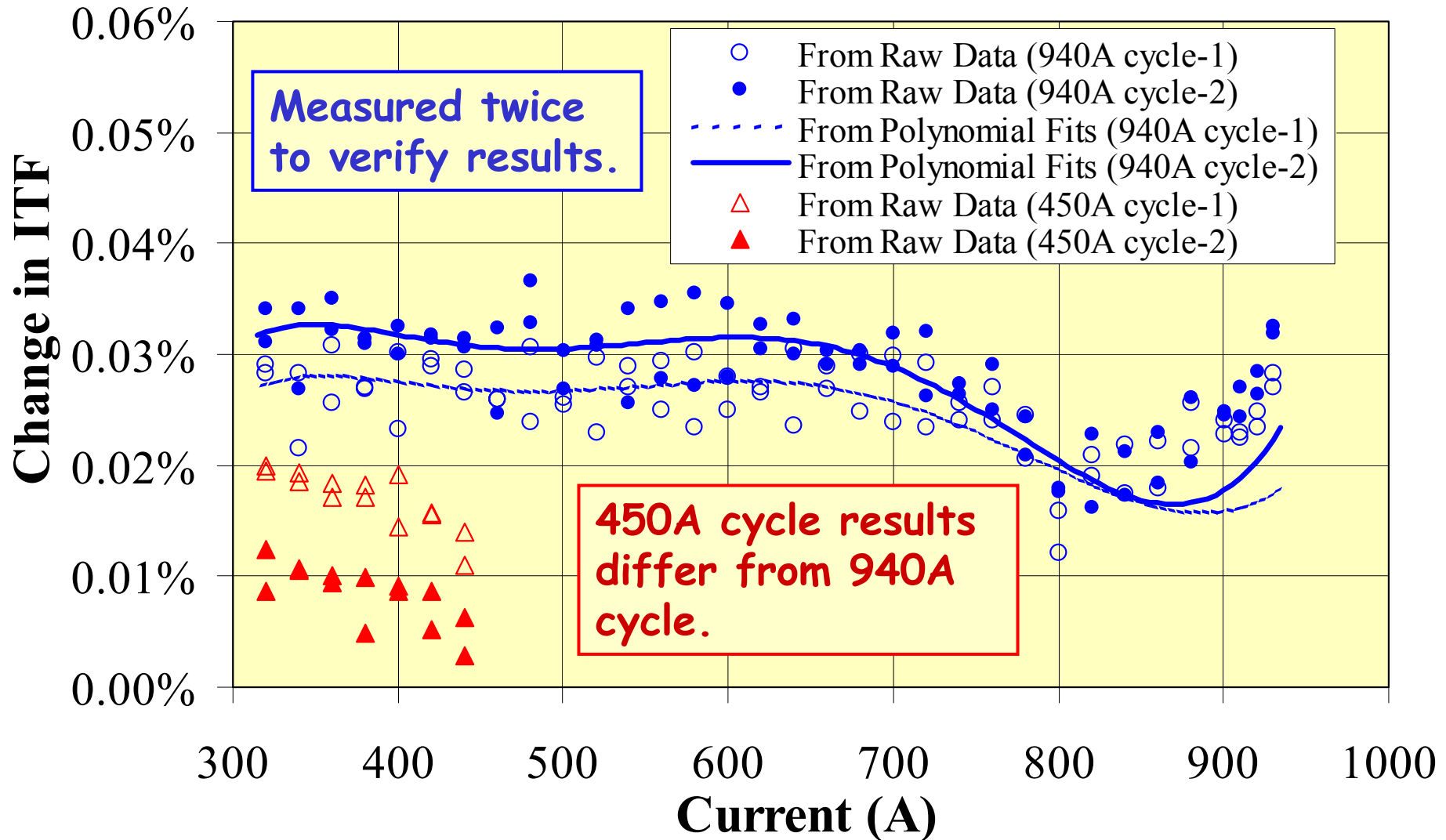
## SQ2115: Effect of 1 mil **Additional** Iron Shims Under Poles



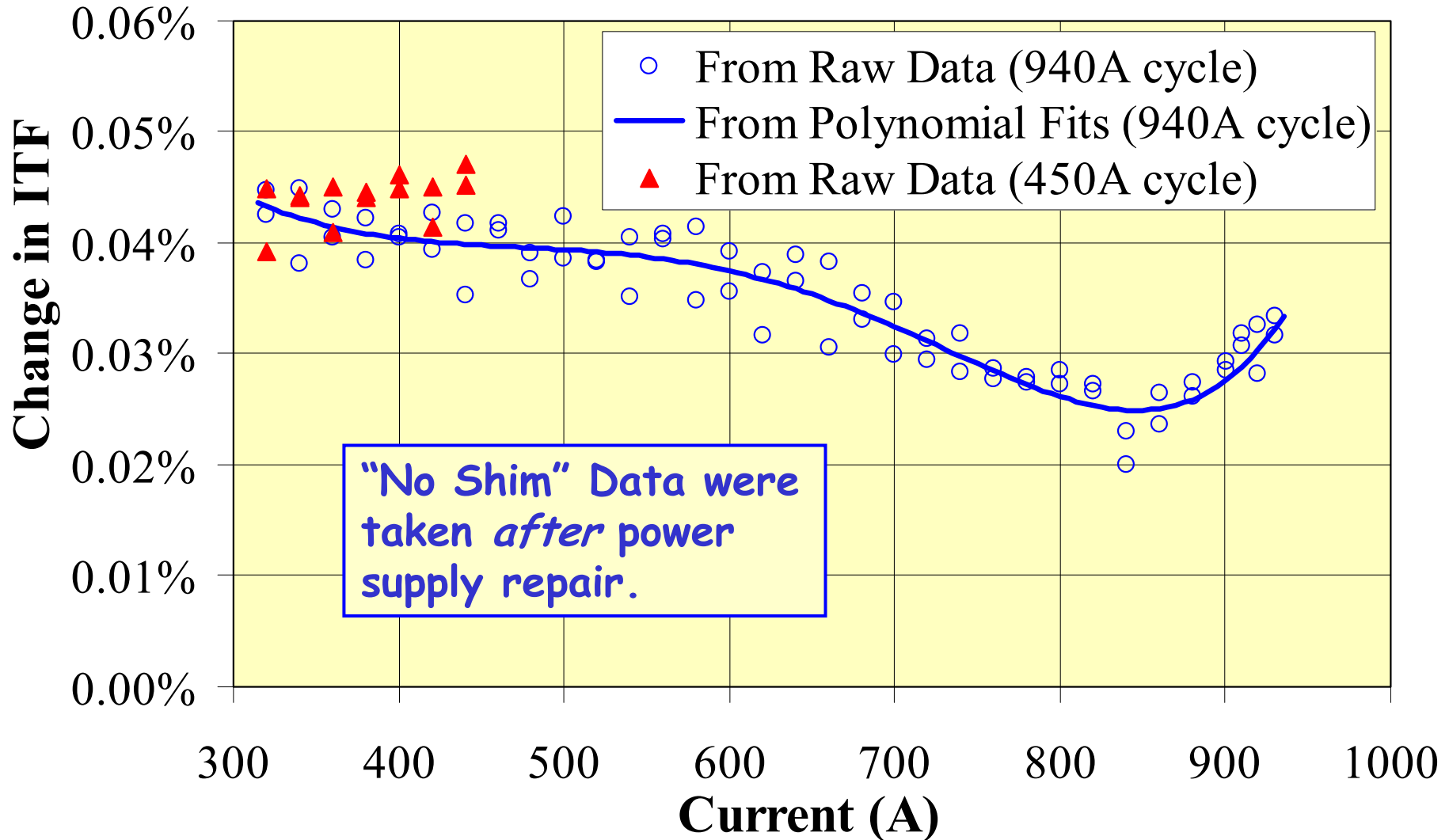
## SQ2116: Effect of 1 mil Iron Shims Under Poles



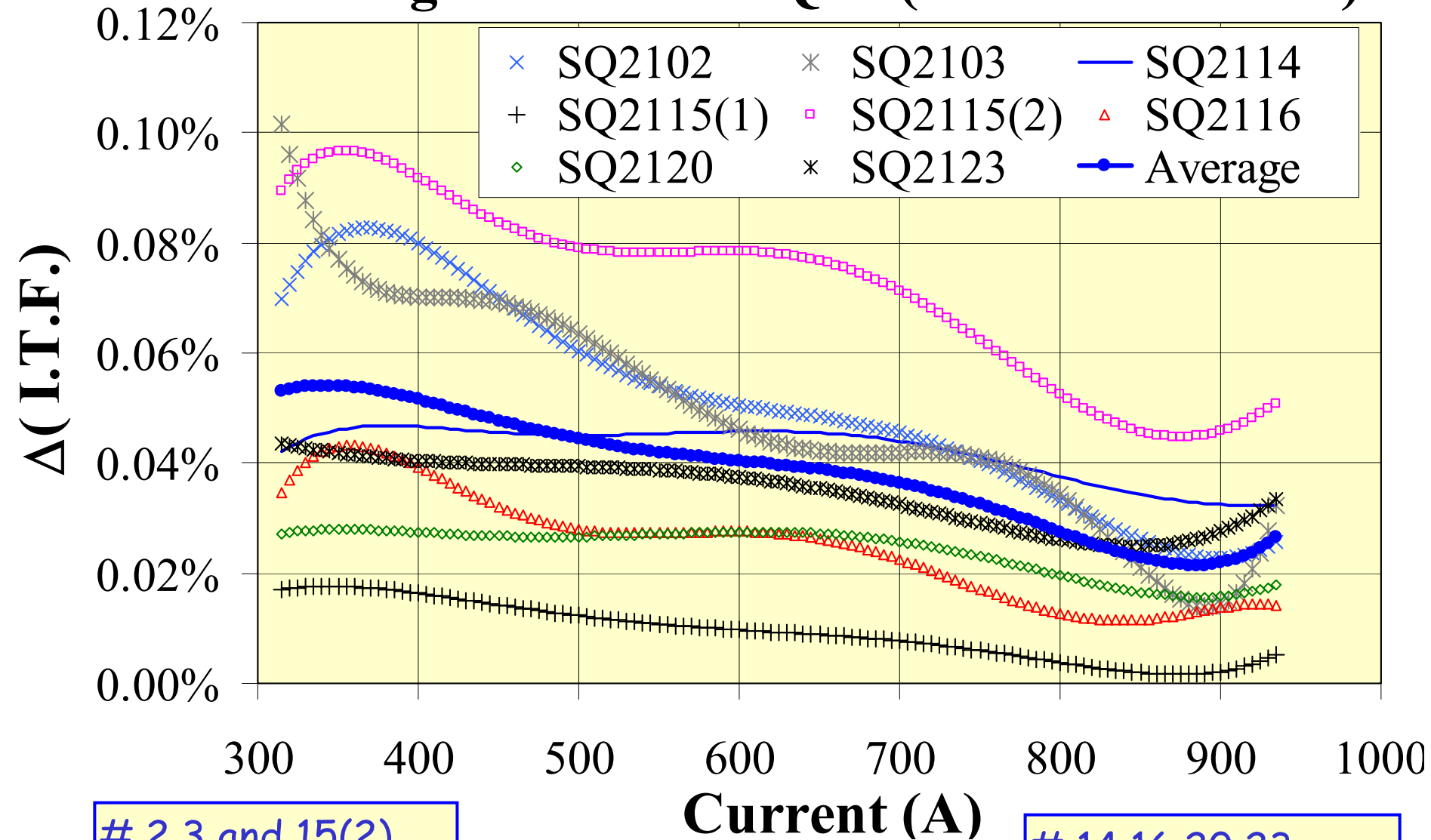
## SQ2120: Effect of 1 mil Iron Shims Under Poles



## SQ2123: Effect of 1 mil Iron Shims Under Poles



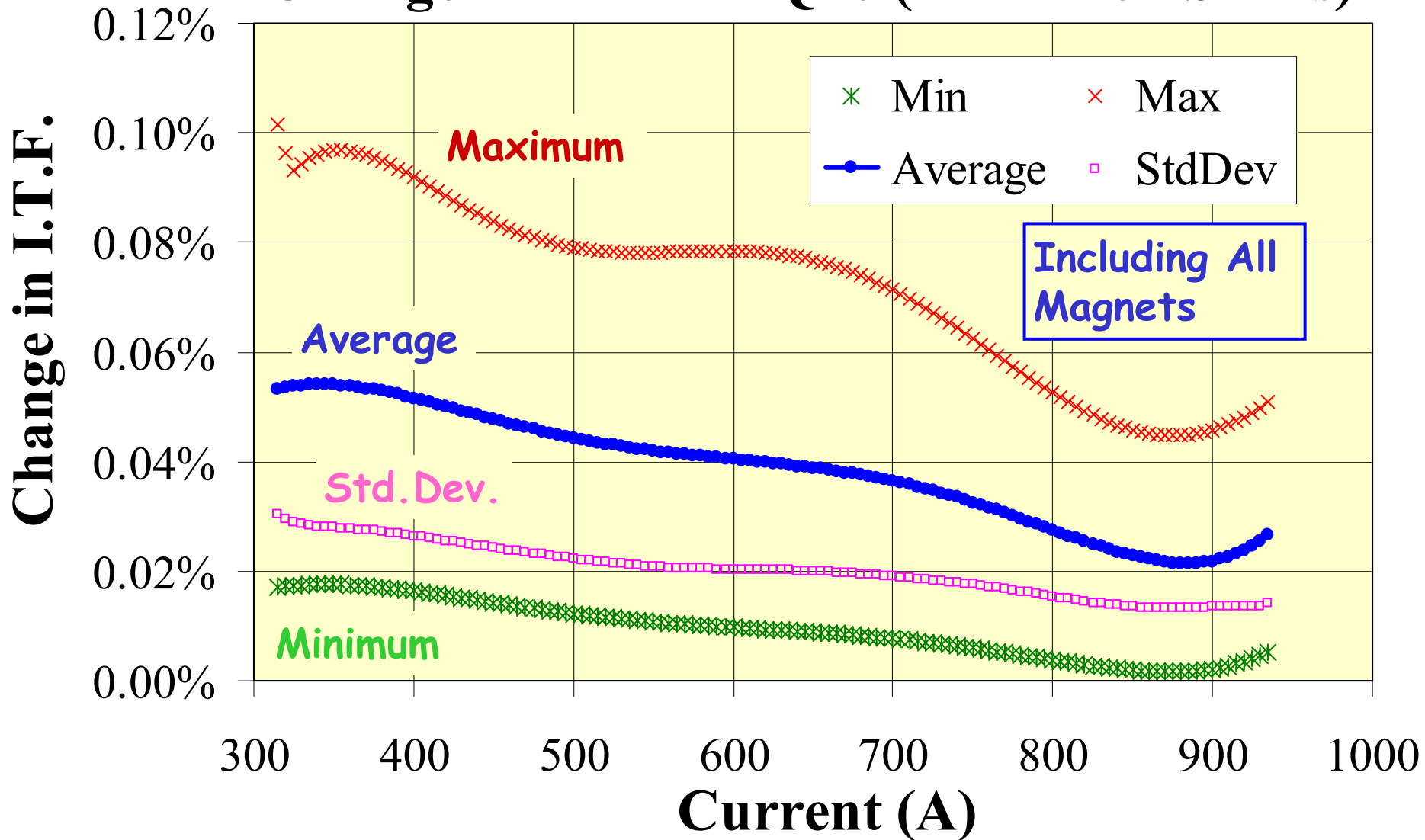
# Change in ITF in 21Q40 ( 1 mil Iron Shims)



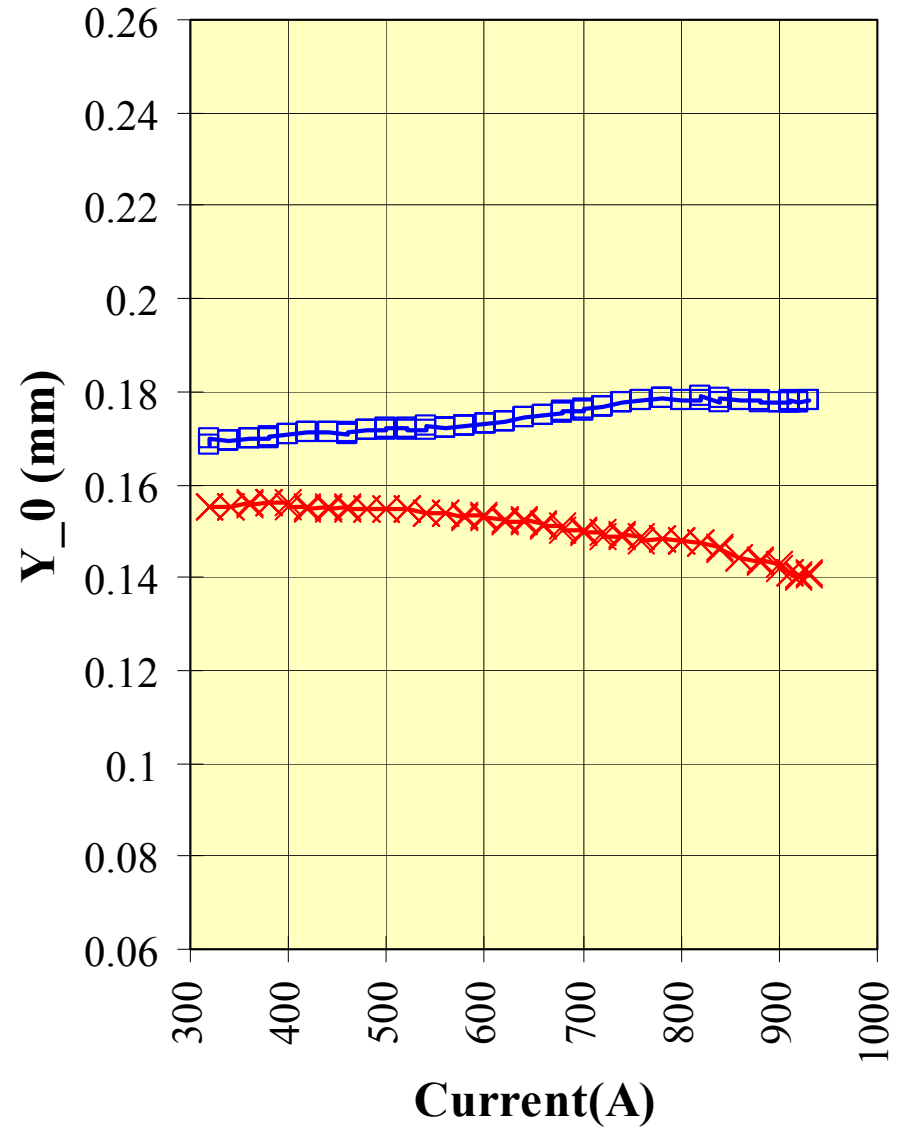
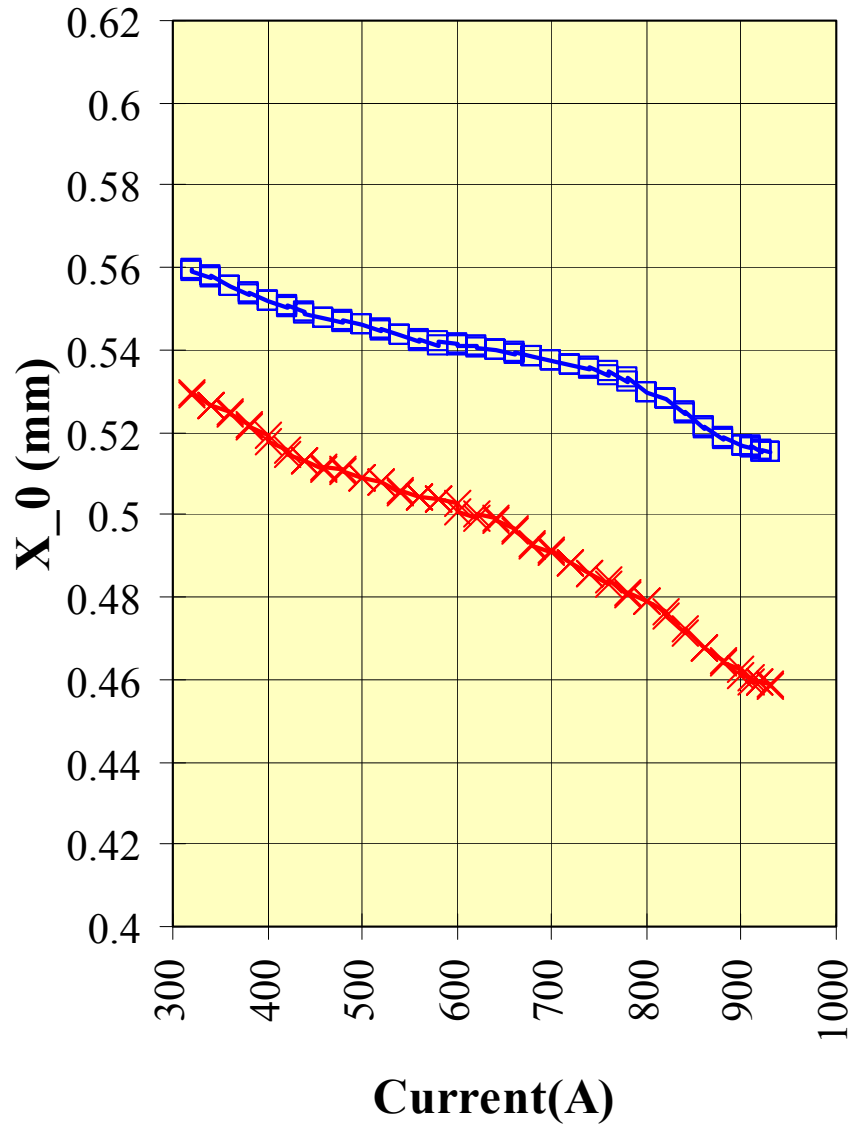
# 2,3 and 15(2)  
show more change.

# 14,16,20,23  
results are similar

## Change in ITF in 21Q40 ( 1 mil Iron Shims)

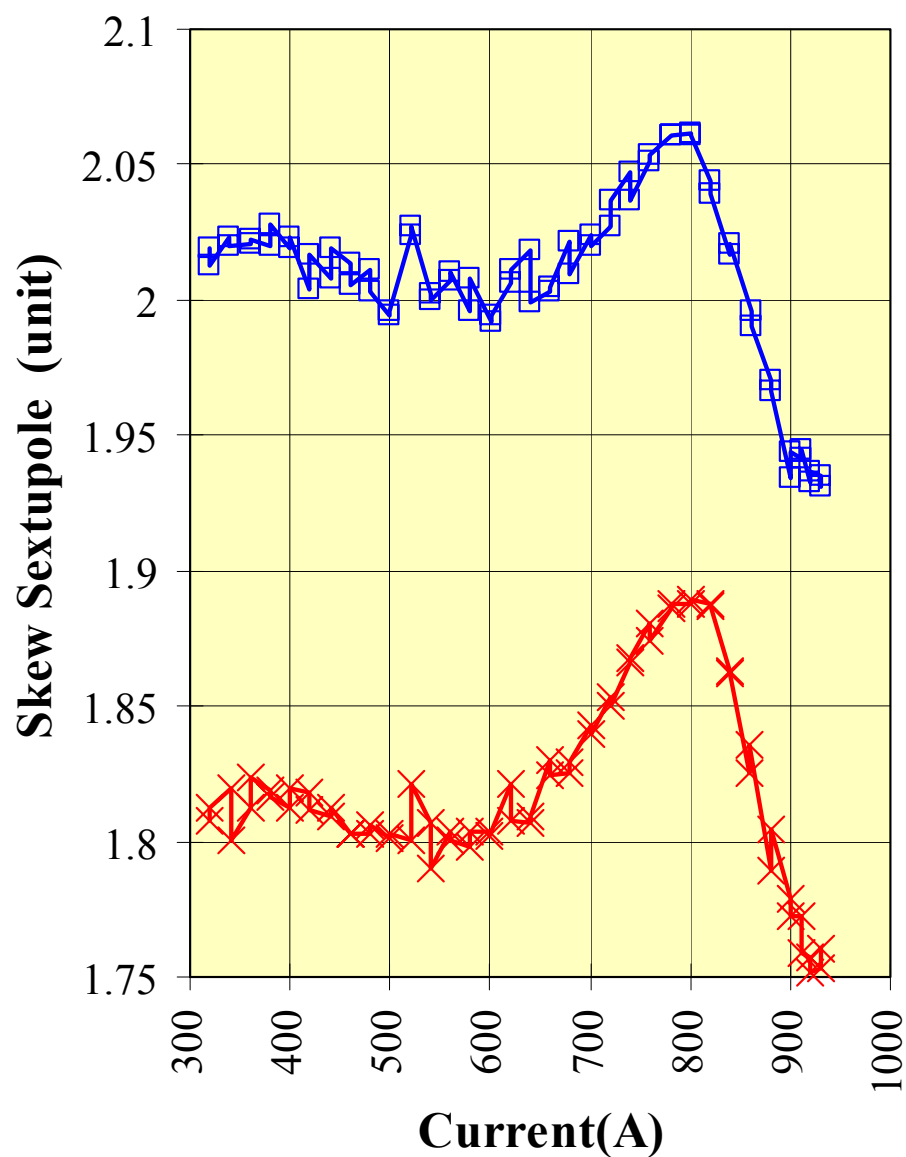
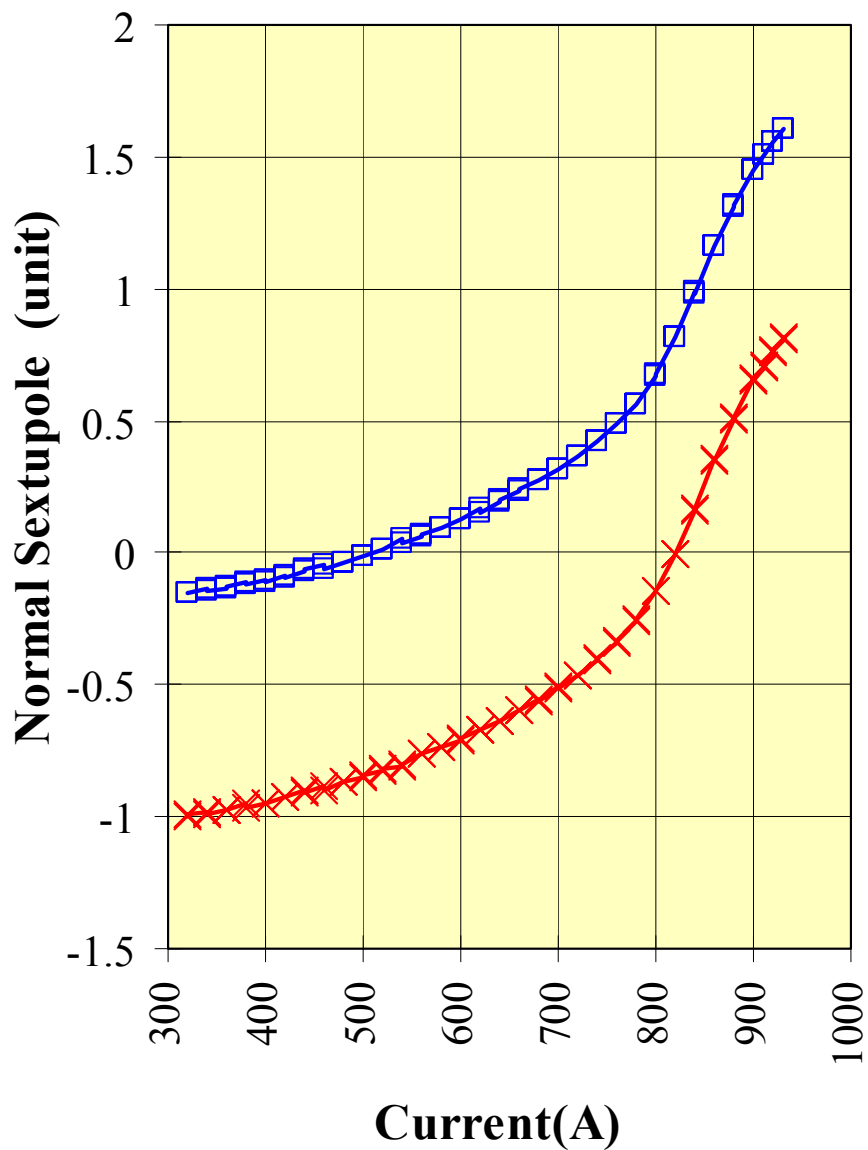


—□— SQ212001.101 (Before Shimming)    —×— SQ212005.101 (1 mil Iron Shims)

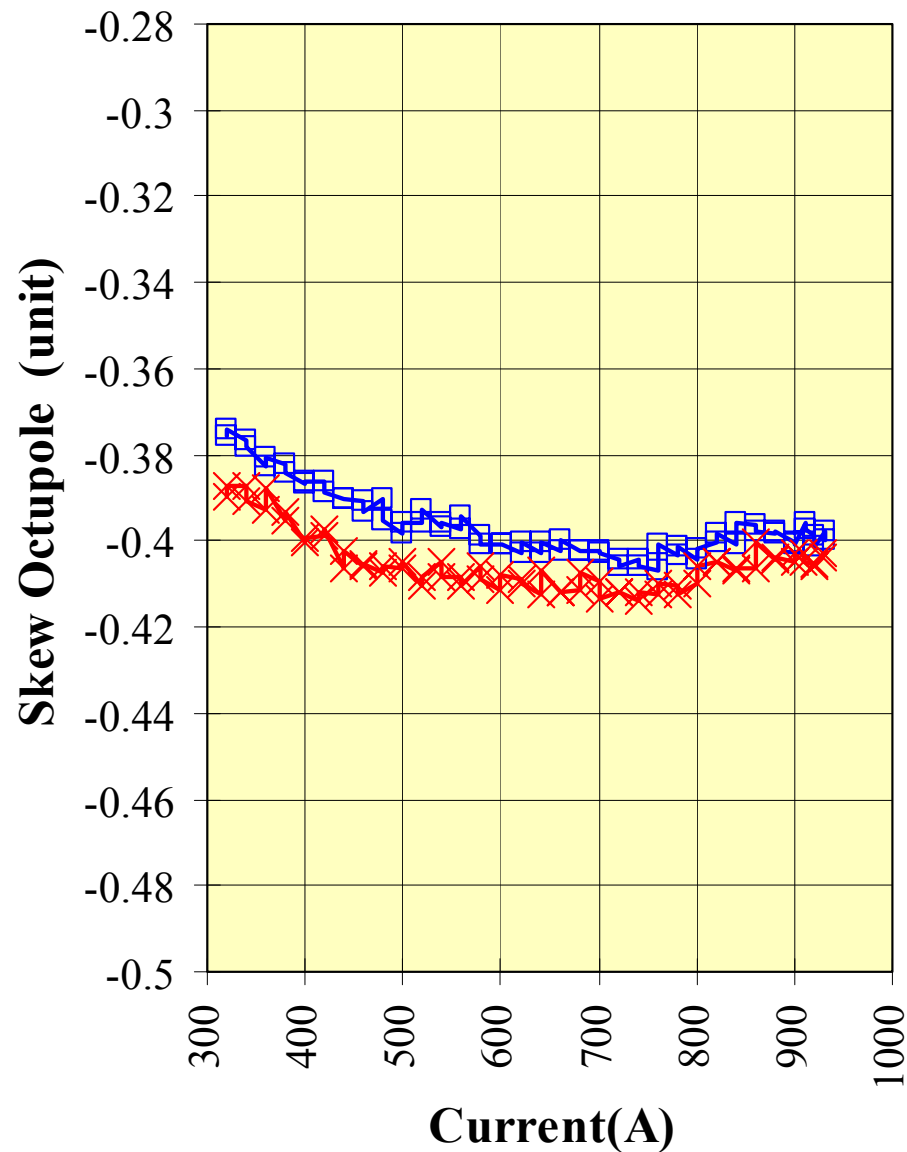
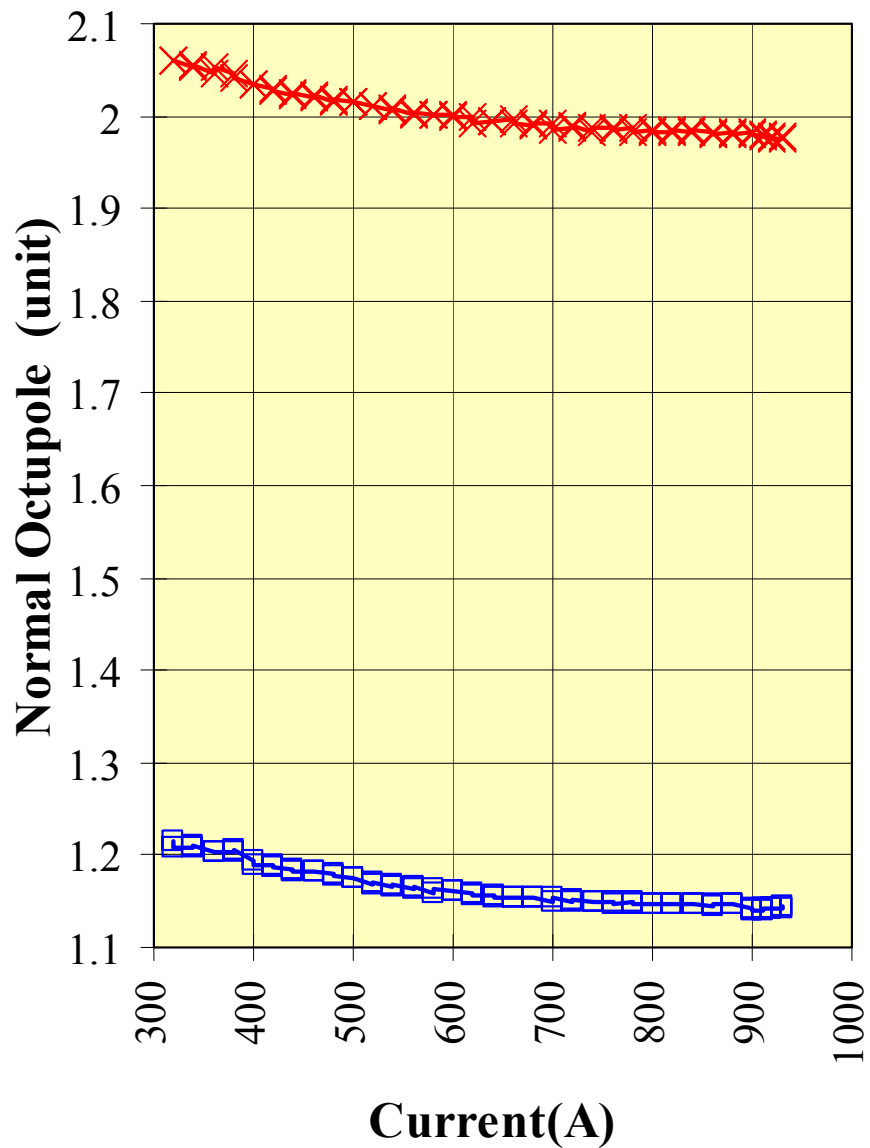




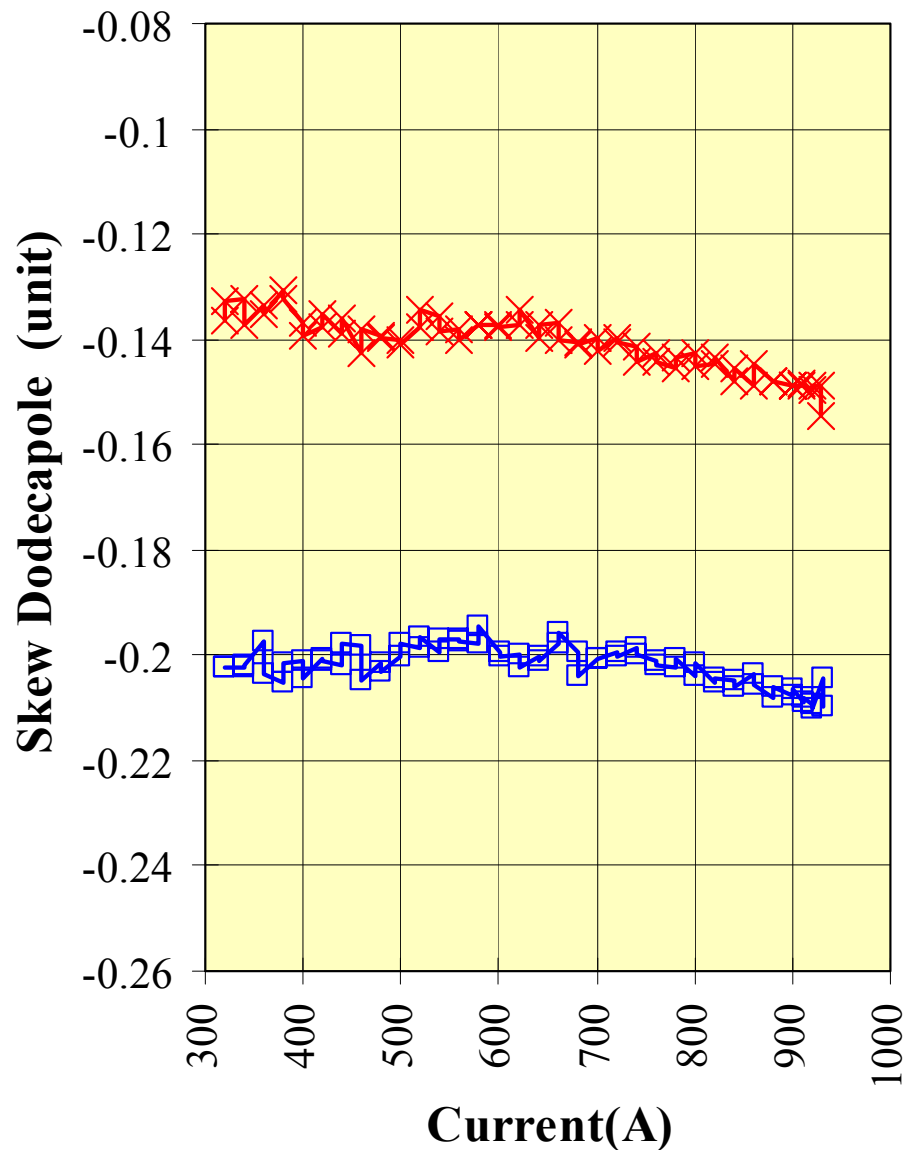
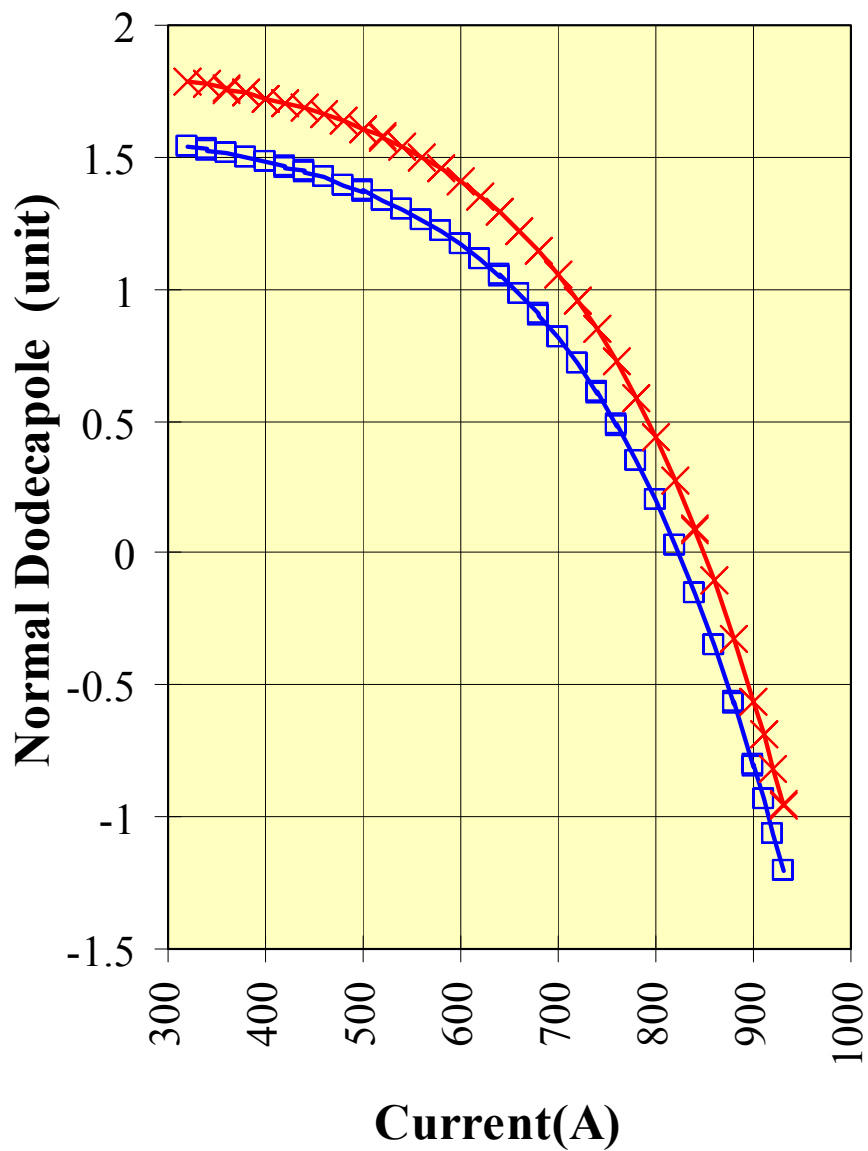
—□— SQ212001.101 (Before Shimming)    
 —×— SQ212005.101 (1 mil  $\sim$  Iron's Shims)



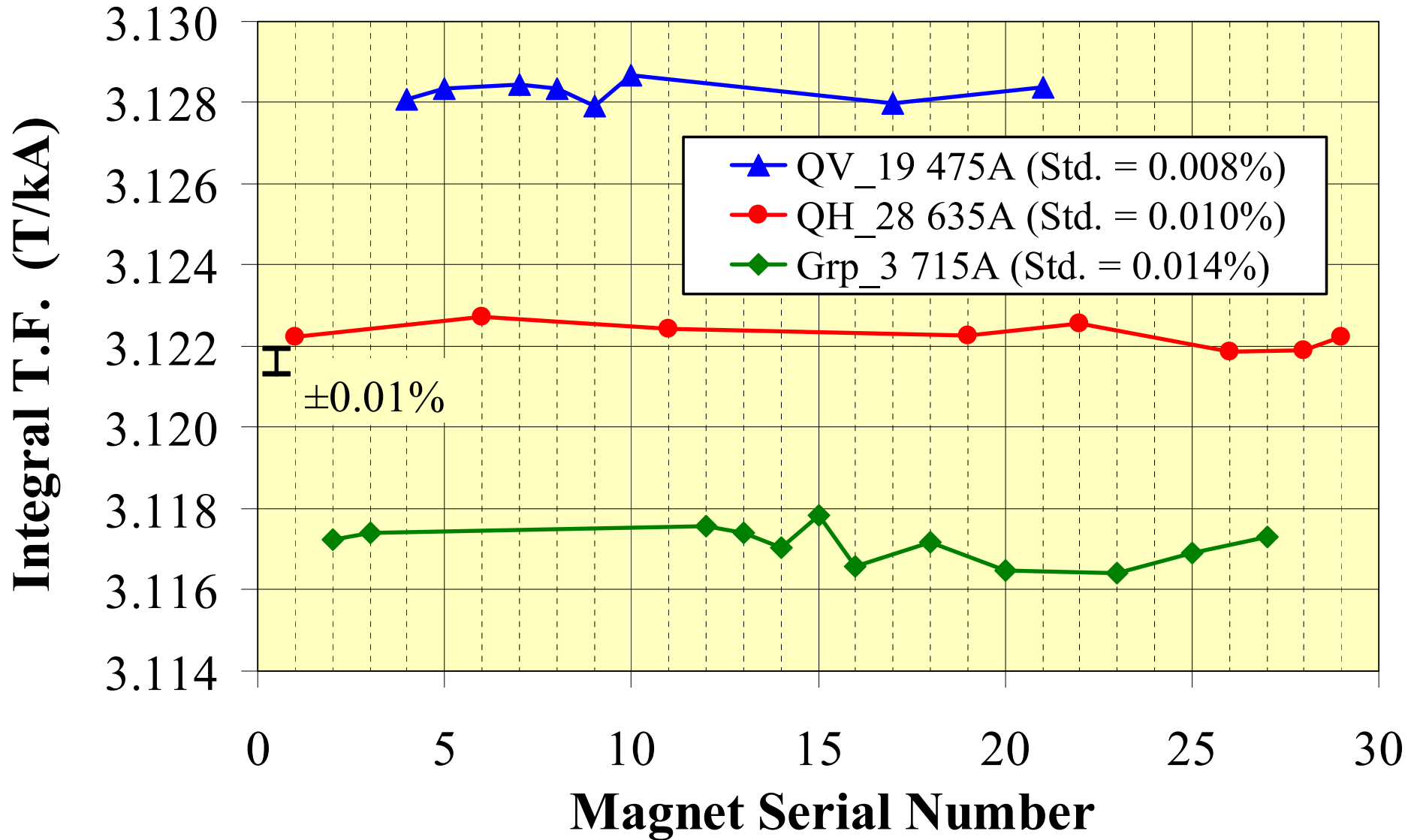
—□— SQ212001.101 (Before Shimming)    
 —×— SQ212005.101 (1 mil  $\epsilon$  Iron Shims)



—□— SQ212001.101 (Before Shimming)    —×— SQ212005.101 (1 mil Stainless Shims)



# 21Q40; 1.0 GeV Group Trends



# 21Q40; 1.3 GeV Group Trends

